

Rotterdam CCUS project Porthos

CATO conference 26 June 2019



Rotterdam **ccus**
project Porthos

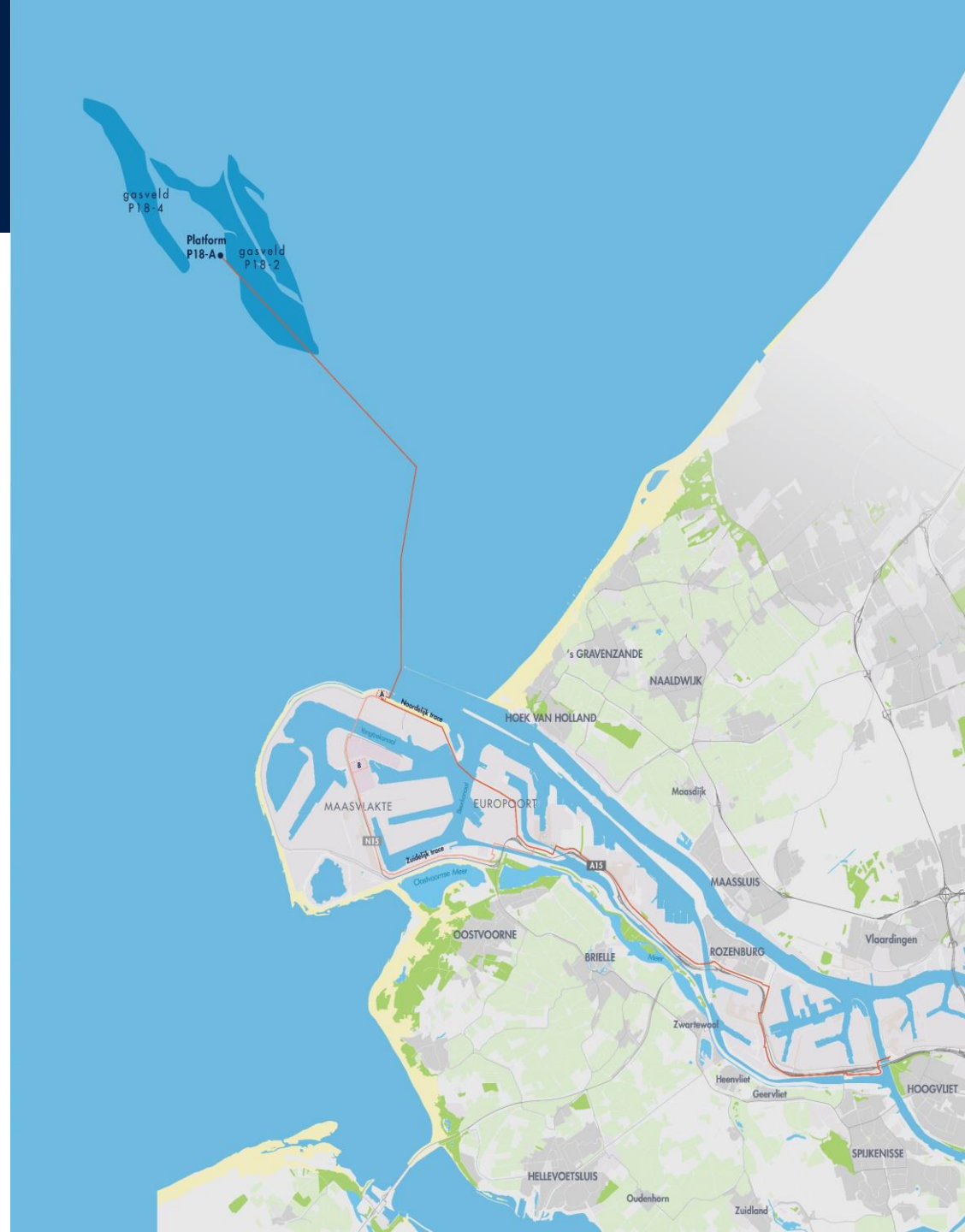
Rotterdam ideal location

- Port of Rotterdam unique location for CCUS
 - ~ 20% national CO₂ emissions
 - Large industrial cluster
 - Relatively small area
 - Cost effective
 - Storage location offshore
 - Combination with other developments in the port, e.g. hydrogen



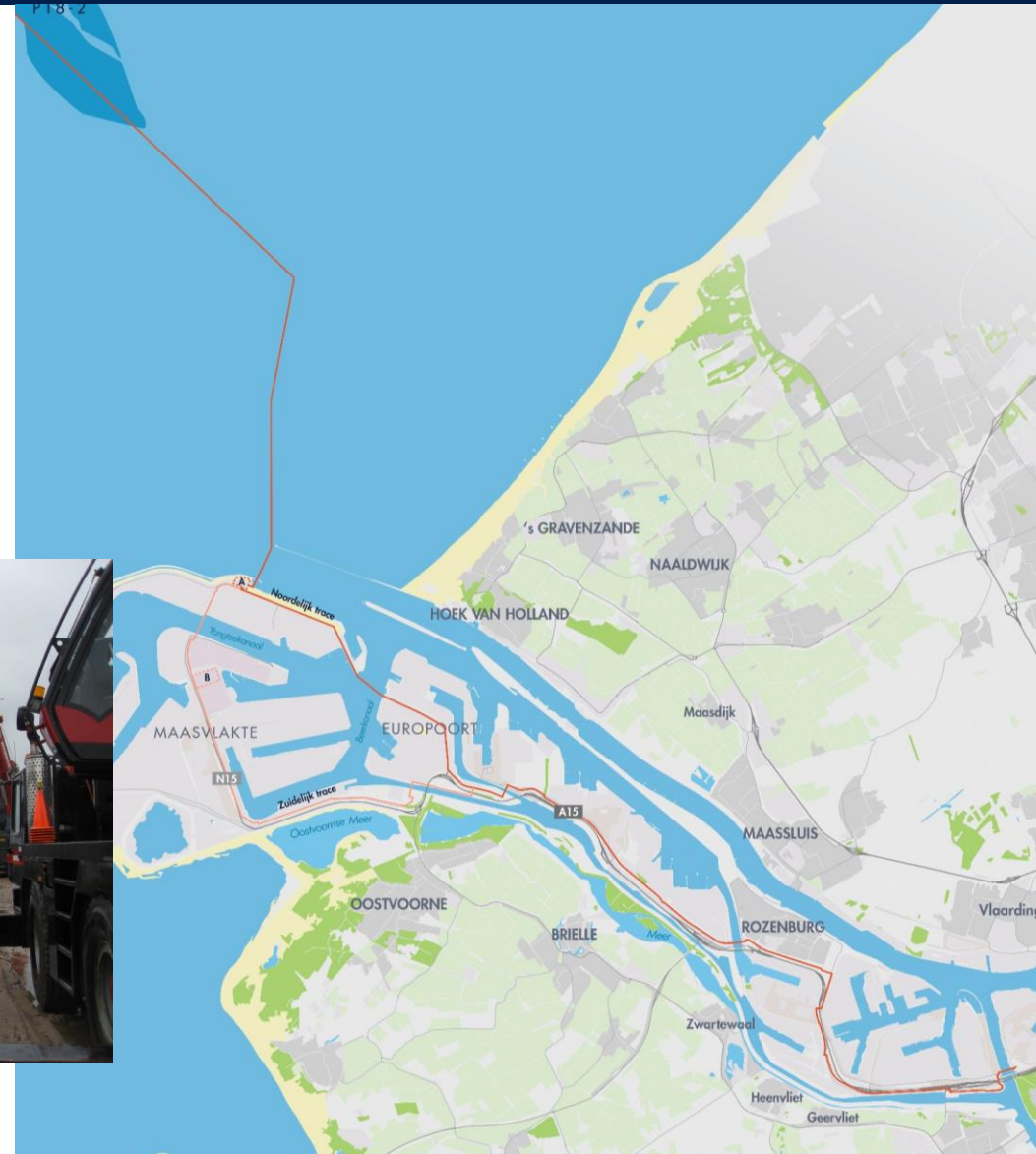
Rotterdam CCUS Project Porthos

- **What:** One-stop-shop for open access CO₂ transport and storage network
- **Why:** to help meet the Dutch and EU CO₂ reduction targets of The Netherlands and the Port of Rotterdam
- **Where:** Rotterdam as CCUS nucleus with storage in offshore P18 gas fields
- **Who:** Initiated by 3 state-owned parties; EBN, Gasunie, Port of Rotterdam.
- **When:** Ambition: ready for FID late 2020 and operational in 2023



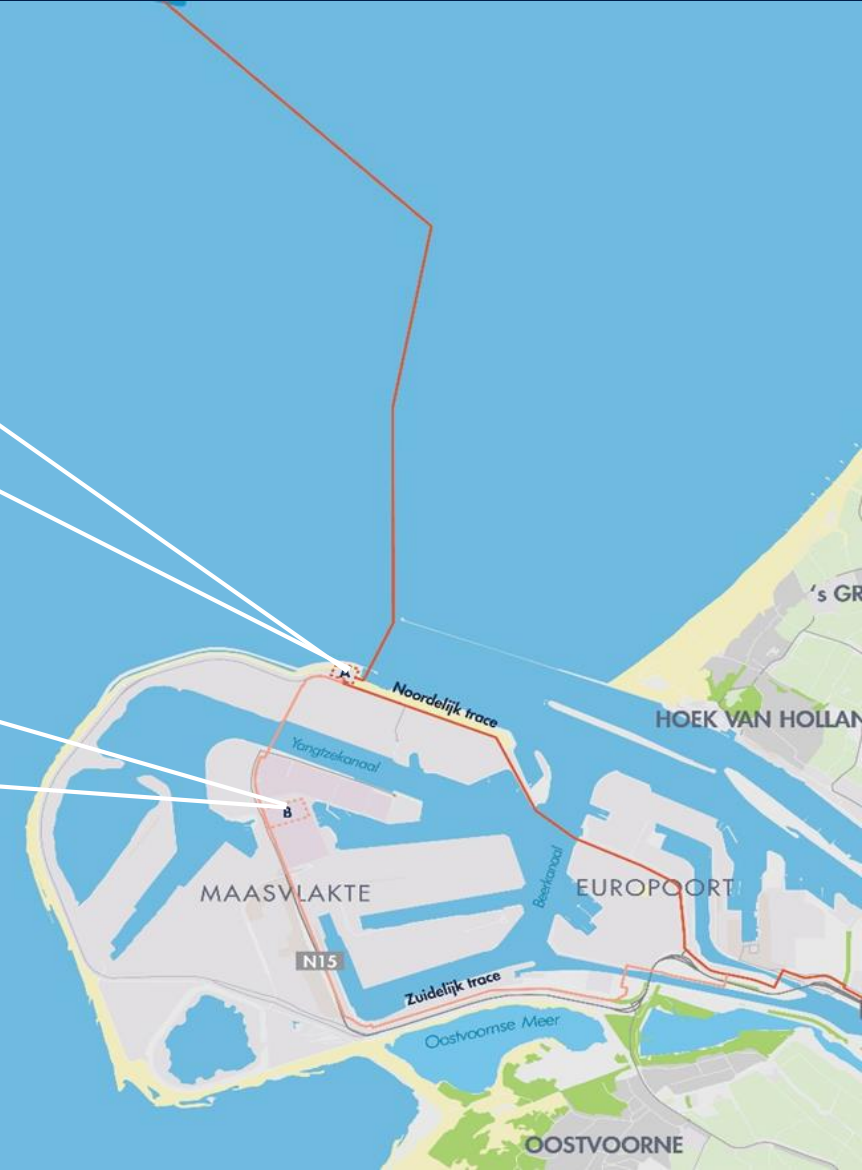
Transport: Onshore pipeline

- In existing pipeline corridor
- Total length: 33 km
- Capacity: 5 Mton per year
- Diameter: 90 or 108 cm
- Northern and southern possible route



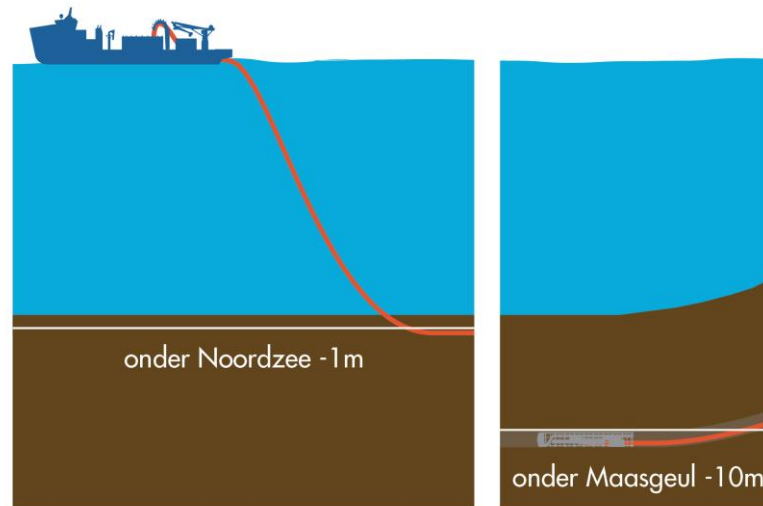
Transport: Compressorstation

- 2 locations: Edisonbaai or Europaweg
- About 6 hectare
- Electricity
- Cooling installations
- Measure- and controlsystems



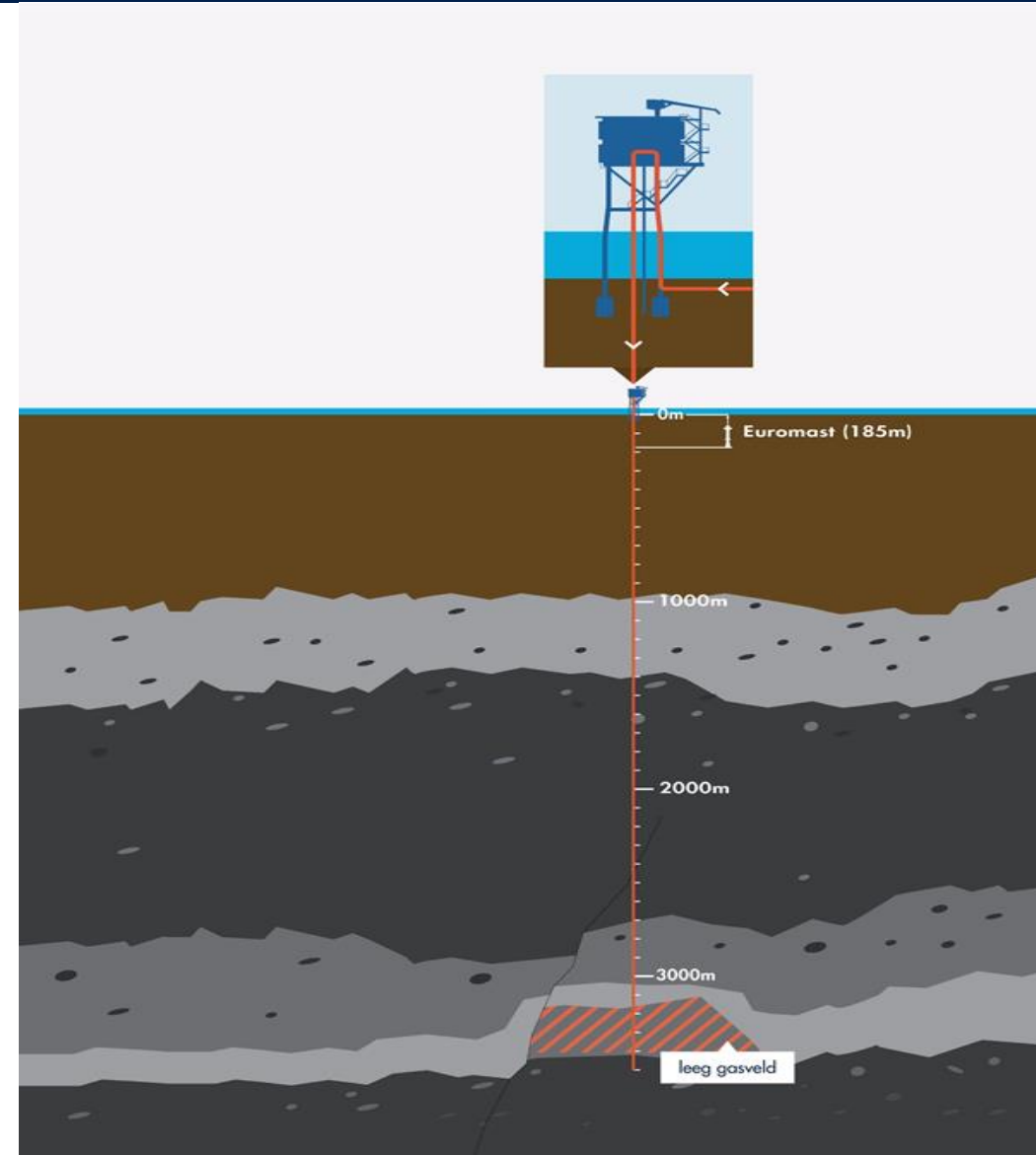
Transport: offshore pipeline

- From the Maasvlakte (compressorstation) under the bottom of the North Sea to the P18 fields
- Diameter: maximal 60 cm
- Total length: 21 km
- Capacity fields: 37 Mton
- Maasgeul: drilling
- At sea: pipe laying ship



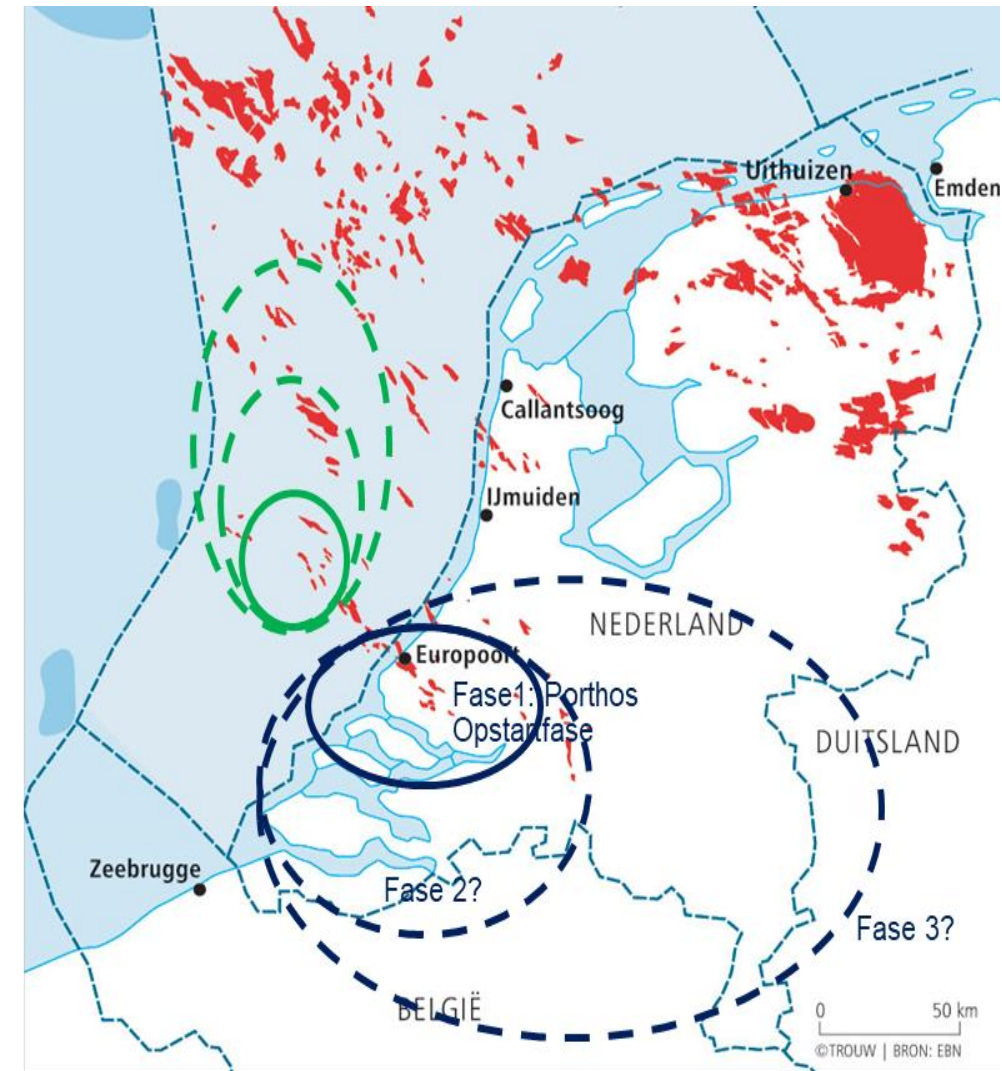
Storage

- (Almost) empty gasfields
- Natural closing through sealing layers
- Depth between 3.175 en 3.455 meter
- Reuse existing platforms and wells



Building a CCUS hub

- Porthos positioned as **hub**, in a next phase capacity for transport up to **10 Mton per year**
- More CCS potential anticipated in The Netherlands **beyond Port of Rotterdam**
- Longer term, possibly accommodating CO2 from **Germany, Belgium**
- Potential to further **reduce CCS unit costs** and obtain valuable expertise on CCS hub development



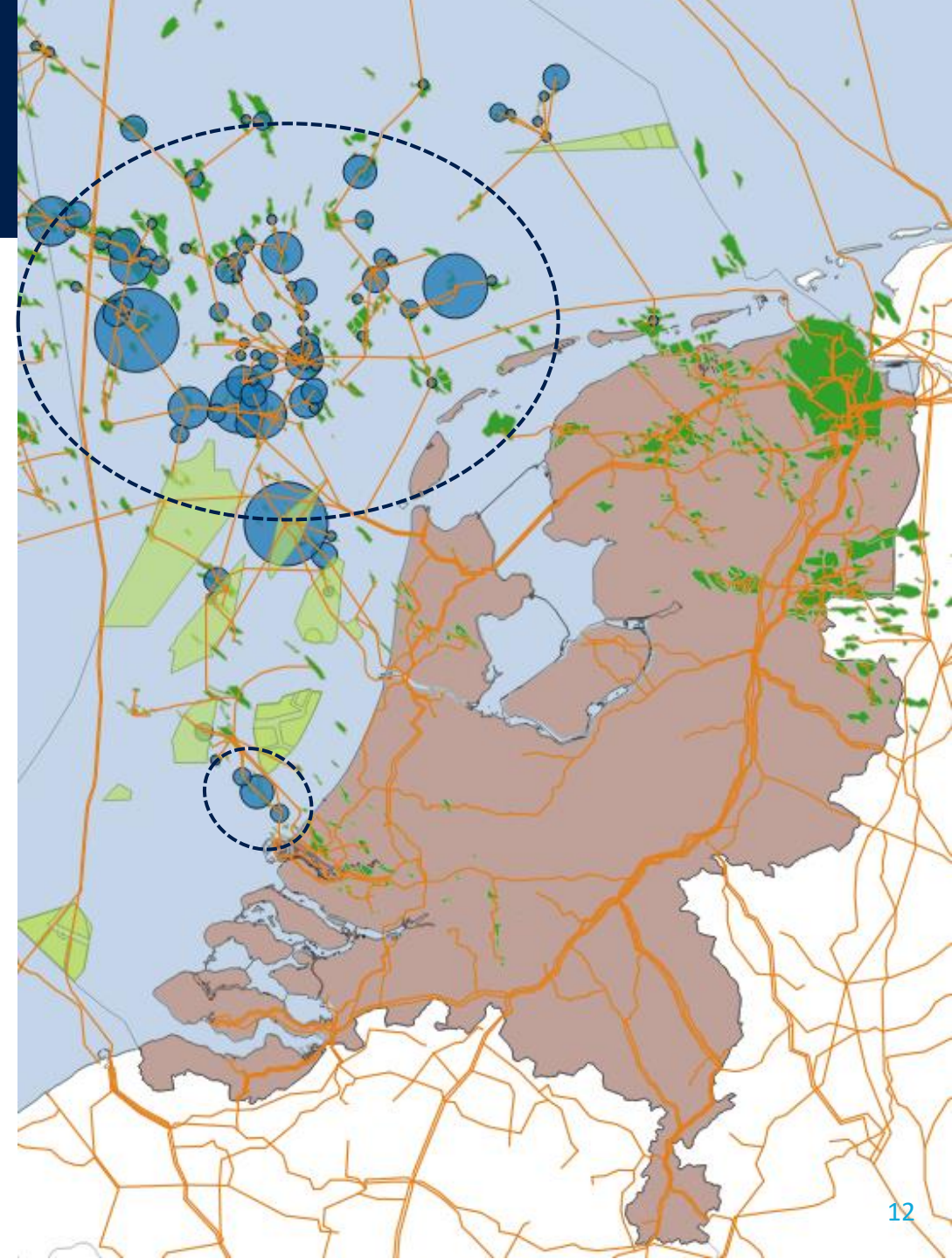
Phased Offshore Development

1. Phase 1: 2-5 mtpa:

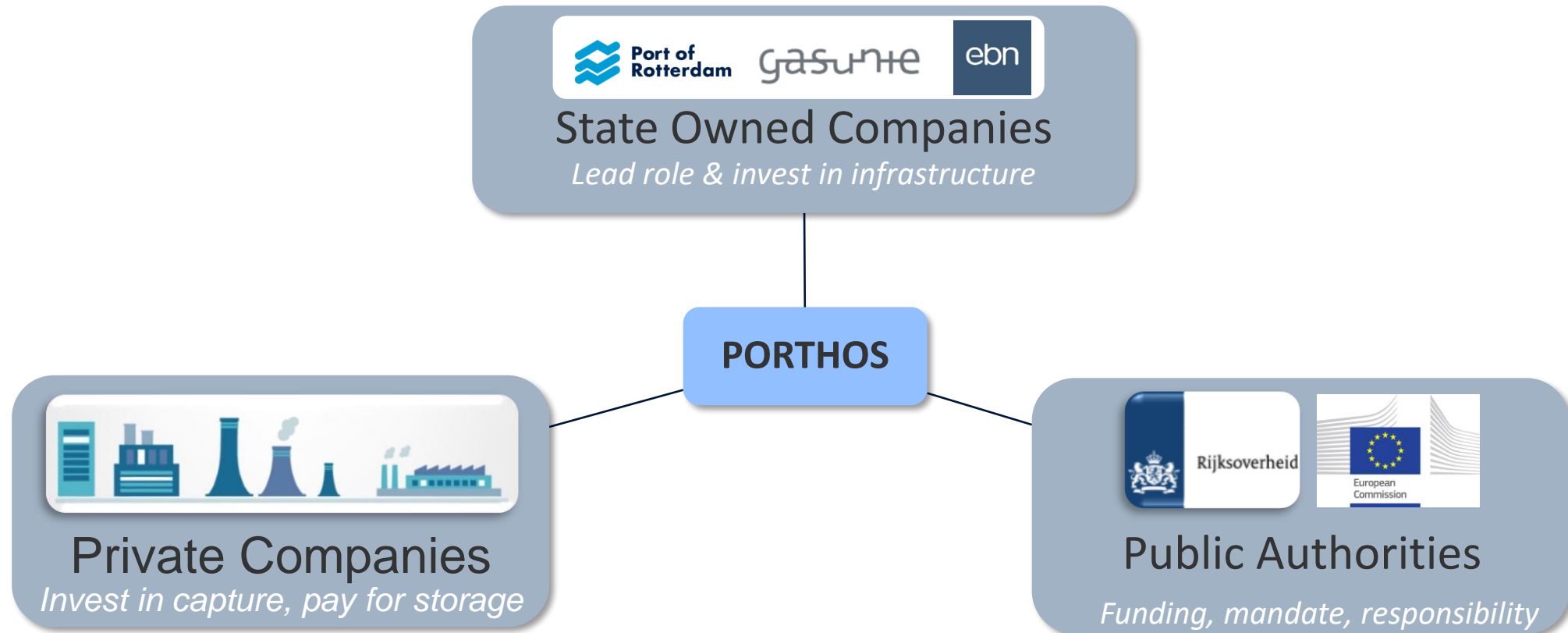
- Near shore
- Pilot project character
- Base for network

2. Phase 2: > 5 mtpa or > 37 mton stored

- To large and efficient storage capacity
- Use of empty gas pipelines
- Offshore network expansion



Public private partnership for successful CCUS



Status of the Porthos project

- ✓ CCS included in preliminary Dutch Climate Accord
subsidy support mechanism (SDE++)
- ✓ PORTHOS finalized Feasibility and Concept Select phases
started Define Phase (Front End Engineering and Design)
- ✓ Expression of Interest process done
Industry expressed sufficient interest
- ✓ Started Environmental Impact Assessment (EIA) procedure
Public consultations in Rotterdam Industrial Area conducted

Challenges ahead towards a Final Investment Decision

- **Business case**

Waiting for final Climate Agreement

- Cap on CCS → possible limitations on volumes for Porthos?
- Extra CO₂ tax besides ETS → uncertainty for business case emitters
- Conditions subsidy support mechanism (SDE++) unclear

- **Regulatory**

- Allocating the storage liabilities and roles and responsibilities
- Connecting the S(torage) and the U(tilisation)

- **Technically**

- Developing a clear operating philosophy based on complex flow control

→ Final Investment Decision late 2020 / early 2021

Thank you for your attention



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